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(54) Title: INTERACTIVE SCROLL PROGRAM GUIDE		
(57) Abstract		
<p>A system interactively controlled by a TV viewer remote control transmitter displays portions of a scroll program guide on the viewer's display screen. A tuner receives TV radio frequency or optical transmission signals in a plurality of cable channels and passes a viewer usable signal to a signal combiner. A computer receives control signals from the TV viewer remote control transmitter. It controls the tuner to pass the viewer usable signal in response to one of the control signals. It receives and stores a scroll input picture image signal containing local program guide data and generates a scroll output picture image signal consisting of at least a portion of the scroll input picture image signal. The signal combiner combines the viewer usable signal from the tuner with the output picture image signal from the computer to provide a display signal for input to the viewer's display screen. The computer is responsive to variable control signals from the remote to advance, back up, and freeze the scroll output picture image signal.</p>		

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INTERACTIVE SCROLL PROGRAM GUIDE

BACKGROUND OF THE INVENTION:

This invention relates generally to interactive video communications and more particularly concerns viewer controlled channel programming guide displays.

Channel programming guide information is presently displayed to the home TV viewer in a non-interactive scroll. When the home viewer selects the channel programming guide display, the display is viewed as it is transmitted from the cable network. Consequently, the viewer may have to wait for almost the entire running time of the scroll for a desired segment of the scroll to be displayed on the viewer's screen. Furthermore, the program information on the scroll is changed at discrete time intervals selected by the cable provider. Consequently, only the programming information included in the discrete time interval of the transmitted scroll can be observed by the home viewer. Later programming information will become available to the viewer only when that programming information comes into the particular discrete time interval selected for transmission by the cable provider. In other words, the viewer has no alternative but to wait for the scroll to display the desired programming time slot and, when it is

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displayed, can view it only for as long as that scroll segment remains on the screen during its normal running time. Any distraction at this juncture starts a new waiting period. It is, therefore, an object of this invention to provide process and in-home scrolling hardware by which a home viewer may interactively control a channel programming guide. Another object of this invention is to provide a process and in-home scrolling hardware in which the scroll can be stopped by the home viewer. Another object of this invention is to provide a process and in-home scrolling hardware by which a home viewer may forward scroll the channel programming guide. Another object of this invention is to provide a process and in-home scrolling hardware by which a home viewer may reverse scroll the channel program guide. Another object of this invention is to provide a process and in-home scrolling hardware by which a home viewer may select a discrete time interval of channel program guide information from a plurality of discrete time intervals of such information.

SUMMARY OF THE INVENTION:

In accordance with the invention, a system interactively controlled by a TV viewer remote control transmitter displays portions of a scroll program guide on the viewer's display screen. A tuner receives TV radio frequency or optical transmission signals in a plurality of cable channels and passes a viewer usable signal of a selected one of the channels to a signal combiner. A computer receives any of a plurality of control signals from the TV viewer remote control transmitter. It also controls the tuner to pass the viewer usable signal in response to one of the control signals from the TV viewer remote control transmitter. It also receives and stores a scroll input picture

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image signal containing local program guide data and generates a scroll output picture image signal consisting of at least a portion of the scroll input picture image signal. The signal combiner combines the viewer usable signal from the tuner with the output picture image signal from the computer to provide a display signal for input to the viewer's display screen. The computer is responsive to a "forward" control signal from the remote to advance the scroll output picture image signal, to a "reverse" control signal from the remote to back up the scroll output picture image signal and to a "stop" control signal from the remote to freeze the scroll output picture image signal. It is also responsive to directional control signals from the remote to reposition "highlight" background to corresponding program data slots on the scroll grid and to display further program information corresponding to the program of the data slot shown in "highlight". In addition, it is responsive to further directional control signals to redraw the grid to display earlier or later time segment program data than is normally displayed on the viewer's screen.

BRIEF DESCRIPTION OF THE DRAWINGS:

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings in which:

FIGURE 1 is a block diagram illustrating a preferred embodiment of the hardware of the interactive scroll program guide;

FIGURE 2 is a flow chart illustrating the basic process and options of the interactive scroll program guide;

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FIGURE 3 is a flow chart illustrating further options of the interactive scroll program guide;

FIGURE 4 is a representation of an interactive scroll program guide display for a selected date and time;

FIGURE 5 is a representation of the interactive scroll program guide display of FIGURE 4 in a "scrolled down" condition relative to FIGURE 4;

FIGURE 6 is a representation of the interactive scroll program guide display of FIGURE 5 in a "highlighted" condition relative to FIGURE 5; and

FIGURE 7 is a representation of the interactive scroll program guide display showing selected information describing the program highlighted in FIGURE 6.

While the invention will be described in connection with a preferred embodiment and process, it will be understood that it is not intended to limit the invention to that embodiment or process. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE INVENTION:

Turning first to Figure 1, the components of the interactive scroll program guide are illustrated. A computer 11 having a command information receiver, preferably an infrared or radio frequency receiver 13, provides a control signal 15 to a tuner 17 and a picture image signal 19 to a digital video board 21. The tuner 17 converts or demodulates radio frequencies or optical transmission to a signal usable by the viewer to output a signal 23 selected from a plurality of signals 25 input to the tuner 17 from the cable

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source (not shown), typically frequency division multiplexed video, audio and data signals transmitted via a coaxial cable, over-the-air radio frequencies or fiber optics. The digital video board 21 converts

5 digital data into a video signal. The tuner output signal 23 is superimposed on or combined with a scroll information picture image signal 27 from the digital video board 21 in a genlock signal combiner or overlayer 29. The combined scroll and TV picture

10 signal 31 is then displayed on a video signal display device such as the display screen 33 of the viewer's television. The viewer sends commands to the receiver 13 to control the operation of the computer 11 by the use of a remote control transmitter, preferably an

15 infrared or radio frequency transmitter 35. The computer 11 is based on a microprocessor and may utilize random access (RAM) and/or read only (ROM) memory. The software necessary to operate the microprocessor may be embedded in the device or

20 downloaded via the cable system to the device via a download circuit 16 from the tuner 17 to the computer 11.

The above described interactive scroll program guide components operate in response to the

25 control of the computer 11. As shown in FIGURE 2, when the home viewer elects to view the scroll mode 51 by operation of the viewer remote control 35, the computer 11 automatically resets the top of the grid 53 so as to set the display of the scroll at its beginning point

30 for viewing. The computer 11 then provides a control signal 15 to the tuner 17 to select the channel designated by the home viewer's cable system as its programming data channel 55. The computer 11 further causes the portion of the display 33 on which the

35 program data is to appear to be masked 57. With the

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existing program guide area of the display masked, the computer 11 causes the picture image signal 19 to be generated, thus causing the program guide grid to be drawn 59. With the grid drawn, the computer 11 further
5 initiates operation of a millisecond timer 61 which causes the picture image signal 19 to be fired in millisecond intervals. The operation of the millisecond timer 61 adjusts the speed of the scroll by changing the number of lines of pixels moved at one
10 time. When a timer interrupt 63 permits a change, the software scrolls the grid by causing deletion of the forward lines 65, copying of the rest of the lines forward to overlay the deleted lines 67 and addition of new lines to the rear of the grid 69. This is repeated
15 every few milliseconds so that a smooth scroll is accomplished.

Each text line is generated when the first pixel line in that text line is needed. This text line is stored in a memory buffer until all of its pixel
20 lines are used and then is replaced by the next test line. This allows the pixels to be used without having to regenerate them each time the scroll is updated. When the last text line is reached, the first text line is generated and added onto the screen in a circular
25 fashion. Thus, the scroll becomes a continuous loop. Typically, the scroll will be changed in one to three pixel line increments and preferably in two pixel line increments for a display having an approximately two hundred pixel line scroll. The current text line is
30 remembered and, if the viewer stops the grid, the current text line is positioned at the top of the grid and the scroll timer halted. Looking at FIGURE 4, the viewer display screen 33 displays, on approximately its top half, the display defined by the viewer usable
35 signal 23 passed by the timer 17 (display not shown).

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it also displays, on approximately the bottom half, a first horizontal date slot divided into vertical columns indicating the proper date 201 and second the program times, as shown, in two half hour increments 203 and 205. Second, third and fourth horizontal data slots are divided into a vertical column showing sequential channel identifications 207, 209 and 211 and into other vertical columns showing program identification data for corresponding channels and times 213, 215 and 217. As shown, the scroll has advanced to illustrate data for channels 15 MAX on slots 217 and 213, 16 ENCORE in slots 209 and 215 and 17 TJC in slots 211 and 217. As scrolling continues the channel 15 MAX data will be removed, the channel 16 ENCORE data and 17 TJC data will move up to slots 207 and 213 and 209 and 215, respectively, channel data will be presented in the lower slots 211 and 217. When the scroll is reversed, the above described process is executed in opposite fashion. That is, the rear bit lines are deleted, the bit lines are moved rearwardly and the last bit lines are added to the front of the grid. Looking at FIGURE 5, the scroll of FIGURE 4 has been reversed so that the channel 17 TJC and channel 16 ENCORE data have been removed, the channel 15 MAX data has moved down to the lower slots 211 and 217 and channel 14 HBO and 13 PREV data have been added to the slots 208 and 215 and 207 and 213, respectively.

In one preferred operating mode of the invention, the "back arrow" key of the remote would be used for reverse scrolling operation, the "forward arrow" key of the remote would be used for forward scrolling, the "enter" key of the remote would be used to stop the scroll, the "right arrow" key of the remote would be used to forward the time slot, the "left arrow" key of the remote would be used to back up the

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time slot, the "stop" key of the remote would be used to exit and the "power" key of the remote would be used as an off switch.

The computer routine will inquire as to
5 whether one of the computer keys used in the routine has been pressed 71. If the answer is "NO", the routine returns to point 73 to maintain the inquiry. If the answer is "YES", the routine continues via another route 75. In the "YES" route 75, the next
10 inquiry may be whether the viewer has selected a user exit 77 by pressing the "stop" key. If the answer to this inquiry is "YES", the routine returns to the previous menu 79. If the answer to this inquiry is "NO", the routine may determine if the viewer has
15 selected a scroll reverse direction 81 by pressing the "back arrow" key. If the answer to this inquiry is "YES", the routine continues through a reversal stage 83 which shifts the pixel rotation as above described and then returns to the routine at point 71 to the key
20 pressed inquiry 71. If the response to the reverse direction inquiry 81 is "NO", the routine may next inquire whether the viewer has chosen to stop the scroll 85 by pressing the "enter key". If the response to this inquiry is "YES", the routine is routed to stop
25 the timer 87 so as to cease the sequence of pixel line rotation. At this point, the routine further directs that the grid be redrawn to the current top channel 89 so as to index the grid to display complete programming data for the top channel displayed on the grid. With
30 the grid thus redrawn, the routine may place the system into a highlight mode 91 to be hereafter explained. In any event, the redrawn grid will be displayed until the viewer selects a new mode of operation.

The user may also select a different
35 programming time slot, thus changing the program

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information displayed. That is, a different picture image signal 19 corresponding to the time slot selected by the viewer will be generated by the computer 11 for display. The entire grid will thus be redrawn for the

5 time slot chosen. Thus, if the response to the stop the scroll inquiry 85 is "NO", the routine may continue to a time forward inquiry 93. At this point in the routine, the screen display continues as shown in

10 FIGURE 4, with the channel identification and program identification slots scrolling in a normal forward sequence as hereinbefore described. If the viewer has pressed the time forward or "right arrow" key, a "YES" response to the time forward inquiry 93 will cause the time slots to be advanced by a predetermined increment

15 time 95 and the grid redrawn 100 so that the scroll will display information relevant to a different time slot. The time slots can be arranged in any predetermined increments, the increments normally being chosen in one hour segments. With the grid redrawn,

20 the routine returns through point 73 to the key pressed inquiry 71 for a repeat of the routine. If the answer to the time forward inquiry 93 is "NO", the routine continues on to a time backward inquiry 97. If the time backward or "left arrow" key has been depressed, a

25 "YES" response will cause the time slots to be backed up by a predetermined decrement time 99 and the grid redrawn 100 to the next earlier time segment in opposite fashion as for the increment time 95 portion of the routine. With the grid redrawn 100, the routine

30 then returns through point 73 to the key pressed inquiry 71 to be repeated. If the answer to the time backward inquiry 97 is "NO", the routine returns through the point 73 to the key pressed inquiry 71 to again continue the routine.

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Turning now to FIGURE 3, another routine option is presented beginning with the highlight mode 91 earlier discussed in relation to FIGURE 2. If the viewer has proceeded through the stop scroll inquiry 85 with a "YES" response, the top program identification slot 213 will be automatically drawn highlighted 101 by a background color different than the remainder of the grid. At this point, the viewer may select one of several keys. For example, the "enter" key would indicate a command to display the first program information highlighted. Alternatively, the "up arrow", "down arrow", "right arrow" and "left arrow" would indicate directional movements of the highlight condition in reference to the program information then highlighted. For example, in FIGURE 6, the viewer has opted to "down arrow" the highlight to the second program identification slot 215. Finally, the "exit" key would be used to indicate a desire to exit the highlight routine of the program. If, at a key pressed inquiry 103, the answer is "NO", the routine returns through point 105 to maintain the key pressed inquiry 103. If, however, the answer is "YES", the routine proceeds to an "enter key" inquiry 107. If the answer to this inquiry is "YES", the routine continues to the display program information stage 109 so that specific information regarding the highlighted program will be displayed on the screen as shown in FIGURE 7. The program would then continue to another key pressed inquiry 111. If the answer to this inquiry is "YES", this will indicate the desire of the viewer to exit the display of that particular selected information and the routine is returned through point 105 to the earlier key pressed inquiry 103 to continue the highlight routine. If the answer to the key pressed inquiry 111 is "NO", the routine returns to the same key pressed

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inquiry 111 to maintain the display presently existing for the viewer. If the response to the enter key inquiry 107 is "NO", the routine proceeds to a direction key inquiry 113. If the answer to this inquiry is "YES", the highlight will move in the direction of the key pressed 115 as above described and the grid will be redrawn 117 to show the highlight moved. With the highlight so moved, the routine will continue through point 105 for the key pressed inquiry 103 for continuance of the highlight routine. If the response to the direction key inquiry 113 is "NO", the routine will proceed to an exit key inquiry 119. If the answer to the exit key inquiry 119 is "YES", the routine will exit back to the user selection or scroll mode 51 shown in FIGURE 2. If the answer to the exit key inquiry 119 is "NO", the routine will continue through point 105 for the key pressed inquiry 103 for continuation of the highlight routine.

Thus, each individual viewer will be provided with an interactive scroll program guide which can be programmed at intervals by the cable provider to provide programming data for multiplicity of viewing time segments. The home viewer can in turn interactively determine whether the scroll of data should be forwarded, reversed, stopped or changed as to the time displayed. In addition, the viewer may select to highlight certain data or to display additional information relevant to a selected program.

Thus, it is apparent that there has been provided, in accordance with the invention, an interactive scroll program guide that fully satisfies the objects, aims and advantages set forth above. While the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be

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apparent to those skilled in the art and in light of the foregoing description. Accordingly, it is intended to embrace all such alternatives, modifications and variations as fall within the spirit of the appended

5 claims.

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What is claimed is:

1. A system interactively controlled by a remote control for displaying portions of a scroll program guide on a display screen comprising:

a tuner having an input for receiving television signals corresponding to a plurality of television channels and an output for providing an output television program signal corresponding to a selected one of said channels;

a computer having input means for receiving control signals from the remote control, output means for directing said tuner to tune to said selected one of said channels in response to one of said control signals from said remote control, means for receiving program guide data, and means for generating a scroll picture image signal corresponding to a portion of said program guide data; and

means for displaying said scroll picture image signal on said display screen as a continuously scrolling grid of program guide information, said computer being responsive to a forward control signal from said remote control to scroll said grid in a forward direction, being responsive to a reverse control signal from said remote control to scroll said grid in a reverse direction, and being responsive to a stop control signal from said remote control to stop said grid.

2. The system of claim 1 wherein said grid includes program guide information for a top channel, said system further comprising means for redrawing said grid on said display screen in response to said stop control signal so that complete program guide data for said top channel is displayed.

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3. The system of claim 1 wherein said grid comprises a plurality of time slots, said system further comprising means for advancing said grid by at least one of said time slots.

4. The system of claim 3 further comprising means for backing up said grid by at least one of said time slots.

5. The system of claim 1 further comprising means for entering a highlight mode in which a portion of said grid corresponding to a selected television program is highlighted.

6. The system of claim 5 further comprising means for displaying additional information relevant to said selected television program.

7. The system of claim 5 further comprising means for moving the highlighted portion of said grid.

8. The system of claim 5 further comprising means for exiting said highlight mode.

9. The system of claim 5 further comprising means for displaying said grid in combination with said output television program signal for said selected one of said channels.

10. The system of claim 9 wherein said selected one of said channels is designated as a programming data channel.

11. The system of claim 1 wherein said grid comprises a predetermined number of lines of pixels,

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the system comprising means for moving said lines of pixels by a predetermined number of lines at predetermined time intervals, thereby scrolling the grid at a predetermined scrolling speed.

12. The system of claim 11 wherein said means for moving said lines of pixels further comprises means for adjusting the scrolling speed of the grid by adjusting the number of lines that are moved at each of said predetermined time intervals.

13. A method of displaying television program guide information on a display using a program guide system, comprising the steps of:

- receiving digitized television program guide data;
- generating a scroll picture image signal corresponding to a portion of the television program guide data;
- displaying said scroll picture image signal on said display in the form of a continuously scrolling grid;
- directing the grid to scroll in a forward direction by transmitting a forward control signal from a remote control to said program guide system;
- directing the grid to scroll in a reverse direction by transmitting a reverse control signal from said remote control to said program guide system; and
- stopping the grid from scrolling by transmitting a stop control signal from said remote control to said program guide system.

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14. The method of claim 13 wherein said grid includes program guide information for a top channel, said method further comprising the step of redrawing said grid on said display screen in response to said stop control signal so that complete program guide data for said top channel is displayed.

15. The method of claim 13 wherein said grid comprises a plurality of time slots, said method further comprising the step of advancing said grid by at least one of said time slots.

16. The method of claim 15 further comprising the step of backing up said grid by at least one of said time slots.

17. The method of claim 13 further comprising the step of entering a highlight mode in which a portion of said grid corresponding to a selected television program is highlighted.

18. The method of claim 17 further comprising the step of displaying additional information relevant to said selected television program.

19. The method of claim 17 further comprising the step of moving the highlighted portion of said grid.

20. The method of claim 18 further comprising the step of exiting said highlight mode.

21. The method of claim 17 further comprising the step of displaying said grid in

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combination with said output television program signal for said selected one of said channels.

22. The method of claim 21 further comprising the step of designating said selected one of said channels as a programming data channel.

23. The method of claim 13 wherein said grid comprises a predetermined number of lines of pixels, said method further comprising the step of moving said lines of pixels by a predetermined number of lines at predetermined time intervals, thereby scrolling the grid at a predetermined scrolling speed.

24. The method of claim 23 further comprising the step of adjusting the scrolling speed of the grid by adjusting the number of lines that are moved at each of said predetermined time intervals.

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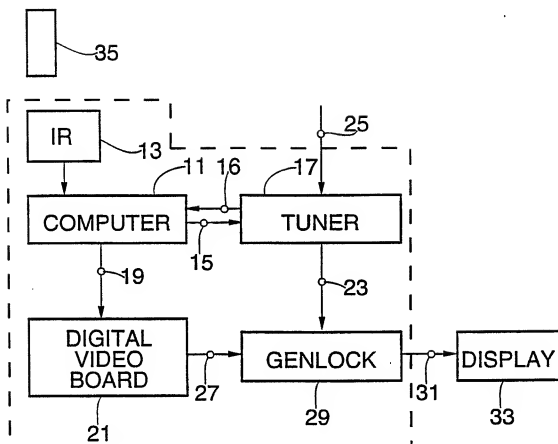


FIG. 1

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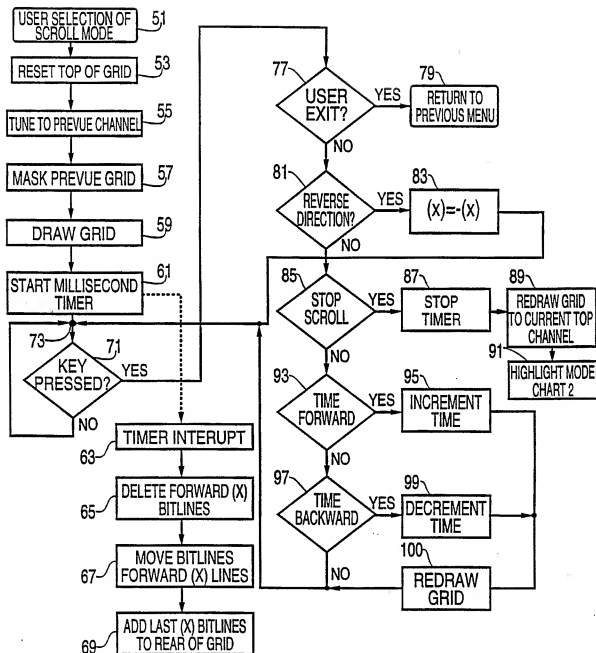


FIG. 2

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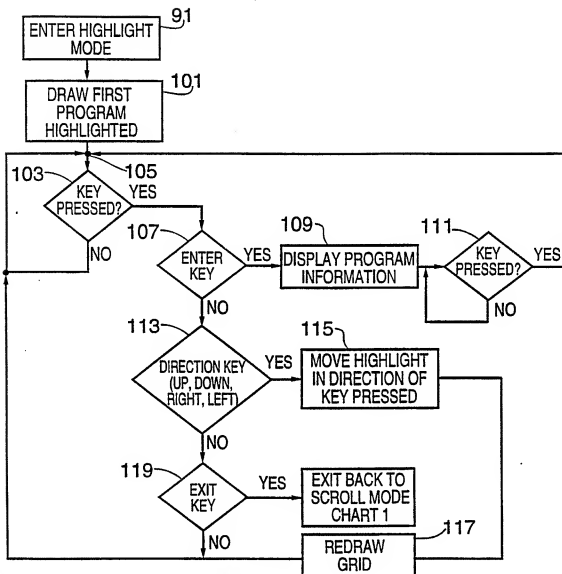


FIG. 3

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				33	
201		203	205		
FEB 24		4:00 PM	4:30 PM		
207	15 MAX	THERE GOES THE NEIGHBORHOOD (COMEDY)		213	
209	16 ENCORE	MURDER BY DEATH (COMEDY) (PG) (CC)		215	
211	17 TJC	◀◀	TULSA PUBLIC SCHOOLS TJC TELECOURSES (CC)	217	

FIG. 4

				33	
201		203	205		
FEB 24		4:00 PM	4:30 PM		
207	13 PREV	◀◀	BEFORE YOU VIEW PREVUE (CC)	213	
209	14 HBO	◀◀	MEN DON'T LEAVE (DRAMA) PG 13	215	
211	15 MAX	THERE GOES THE NEIGHBORHOOD (COMEDY)		217	

FIG. 5

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FEB 24	4:00 PM	4:30 PM
13 PREV	BEFORE YOU VIEW PREVUE (CC)	
14 HBO		MEN DON'T LEAVE (DRAMA) PG 13
15 MAX	THERE GOES THE NEIGHBORHOOD (COMEDY)	

FIG. 6

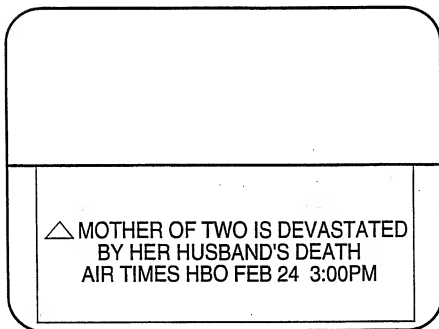


FIG. 7

INTERNATIONAL SEARCH REPORT

Inter: nal Application No
PCT/US 95/04392

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N5/445

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB-A-2 264 409 (AMSTRAD PLC) 25 August 1993	1,5,13, 17
A	see the whole document ---	
Y	CABLE TV SESSIONS, MONTREUX, JUNE 10 - 15, 1993, no. SYMP. 18, 11 June 1993 POSTES, TELEPHONES ET TELEGRAPHES SUISSES, pages 571-586, XP 000379382 BRUGLIERA V 'DIGITAL ON-SCREEN DISPLAY A NEW TECHNOLOGY FOR THE CONSUMER INTERFACE' see page 582 - page 585; figures 5-7 --- -/-	1,5,8, 13,17, 18,20

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO-A-91 05436 (VIDEOLOGIC LTD) 18 April 1991 see page 3, line 14 - page 4, line 36; figures 1-3 see abstract ---	1,5,8, 13,17, 18,20
A	WO-A-86 01359 (PRUTEC LTD) 27 February 1986 see page 11, line 7 - line 24 see page 7, line 1 - page 8, line 31; figures 5,6 ---	1,13
A	GB-A-2 232 031 (PIONEER ELECTRONIC CORP) 28 November 1990 see page 2, line 20 - page 3, line 11; claim 1 -----	1,5,9, 13,17,21

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Information on patent family members

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PCT/US 95/04392

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